

Indian Point 3  
Nuclear Power Plant  
P.O. Box 215  
Buchanan, New York 10511  
914-736-8001



Robert J. Barrett  
Site Executive Officer

July 7, 2000  
IPN-00-053

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555

SUBJECT: Indian Point 3 Nuclear Power Plant  
Docket No. 50-286  
License No. DPR-64  
Licensee Event Report # 2000-008-00  
**Automatic Reactor Trip as a Result of Direct Trip from  
the Buchanan 345 KV Substation Upon Protective Relay  
Conductors Low Insulation Resistance Fault**

Dear Sir:

The attached Licensee Event Report (LER) 2000-008-00 is hereby submitted as required by 10 CFR 50.73. This event is of the type defined in 10 CFR 50.73 (a)(2)(iv) for a condition recorded in the New York Power Authority's (NYPA) corrective action process as Deviation Event Report (DER) 00-01448.

NYPA is making no new commitments in this LER.

Very truly yours,

A handwritten signature in black ink, appearing to read 'Robert J. Barrett', written over a horizontal line.

Robert J. Barrett  
Site Executive Officer  
Indian Point 3 Nuclear Power Plant

cc: See next page

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Docket No. 50-286

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cc: Mr. Hubert J. Miller  
Regional Administrator  
Region I  
U.S. Nuclear Regulatory Commission  
475 Allendale Road  
King of Prussia, Pennsylvania 19406-1415

INPO Record Center  
700 Galleria Parkway  
Atlanta, Georgia 30339-5957

U.S. Nuclear Regulatory Commission  
Resident Inspector's Office  
Indian Point 3 Nuclear Power Plant

## LICENSEE EVENT REPORT (LER)

(See reverse for required number of  
digits/characters for each block)

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

FACILITY NAME (1)

Indian Point 3

DOCKET NUMBER (2)

05000286

PAGE (3)

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TITLE (4)

Automatic Reactor Trip as a Result of Direct Trip from the Buchanan 345 KV Substation Upon Protective Relay  
Conductors Low Insulation Resistance Fault

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)		
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER	
06	09	2000	2000	-- 008	-- 00	07	07	2000	FACILITY NAME	DOCKET NUMBER	
										05000	
OPERATING MODE (9)		N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more) (11)								
POWER LEVEL (10)		100	20.2201(b)			20.2203(a)(2)(v)			50.73(a)(2)(i)		50.73(a)(2)(viii)
			20.2203(a)(1)			20.2203(a)(3)(i)			50.73(a)(2)(ii)		50.73(a)(2)(x)
			20.2203(a)(2)(i)			20.2203(a)(3)(ii)			50.73(a)(2)(iii)		73.71
			20.2203(a)(2)(ii)			20.2203(a)(4)		<input checked="" type="checkbox"/>	50.73(a)(2)(iv)		OTHER
			20.2203(a)(2)(iii)			50.36(c)(1)			50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(iv)			50.36(c)(2)			50.73(a)(2)(vii)		

## LICENSEE CONTACT FOR THIS LER (12)

NAME

Angelo Vai, Electrical Design Engineering Supervisor

TELEPHONE NUMBER (Include Area Code)

(914) 788-2647

## COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	FK	CBL	X999	Y					

## SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
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## ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On June 9, 2000 an automatic reactor trip (RT) occurred. The RT occurred as a result of a main turbine trip with reactor power greater than the P-8 permissive set point. The main turbine trip was caused by a main generator trip initiated by the electrical protective relaying direct trip circuitry from the offsite 345 KV Buchanan Substation. This direct trip circuitry actuated the main generator primary and backup lockout (86P and 86 BU) relays. All primary and secondary plant systems responded as required after the automatic RT. Station offsite power was maintained throughout the event and there was no automatic start of the Emergency Diesel Generators. The Auxiliary Feedwater system automatically started after this RT due to a low-low Steam Generator (S/G) level resulting from the S/G water level "shrink." The most probable cause of the direct trip circuitry actuation was a low insulation resistance between several conductors in a cable routed between Indian Point 3 (IP3) and the Buchanan Substation 345 KV South Ring Bus Control House. Corrective actions include disconnecting the faulted conductors and wiring in spare conductors and testing the direct trip circuitry for acceptable functionality. This event had no impact on the public health and safety.

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		2000	-- 008	-- 00	

**TEXT** (If more space is required, use additional copies of NRC Form 366A) (17)

Note: The Energy Industry Identification System Codes are identified within the brackets { }

## DESCRIPTION OF THE EVENT

On June 9, 2000, at approximately 1315 hours, with the reactor at approximately 100 percent steady state, an automatic reactor trip (RT){JC} occurred and Auxiliary Feedwater Pumps {BA} were automatically started. The RT occurred as a result of a main turbine trip {JD}, which satisfied the Reactor Protection System (RPS) logic, with reactor power greater than the P-8 permissive set point. The main turbine trip was caused by a main generator trip which was initiated as a result of a direct trip from the Buchanan 345 KV substation {FK}. This direct trip actuated the main generator primary (86P) and backup (86BU) lockout relays. The pumps of the Auxiliary Feedwater (AFW) system {BA} automatically started after the RT due to "shrink" of Steam Generator (S/G) water levels to the low-low S/G level setpoint. Subsequent to the RT, the Control Room (CR) operators entered Emergency Operating Procedure, E-O, "Reactor Trip or Safety Injection" at approximately 1315 hours and then transitioned to ES-0.1, "Reactor Trip Response", at approximately 1318 hours. All primary and secondary systems responded as required. Station offsite power was maintained and there was no automatic start of the Emergency Diesel Generators {EK}. At approximately 1409 hours the CR operators transitioned to Plant Operating Procedure 3.1, "Plant Shutdown from 45% Power." The plant was then stabilized in hot shutdown condition, and the transient was terminated. At approximately 1539 hours, a four-hour non-emergency notification (Incident Log No. 37071) was made to the NRC for an RPS/AFW actuation in accordance with 10CFR50.73 (a)(2)(iv).

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An investigation into the cause of the trip was initiated and a post transient evaluation was performed. Troubleshooting by instrumentation & control personnel as well as engineering personnel at Indian Point 3 (IP3) and within the Consolidated Edison Transmission Group determined low insulation resistance readings between several conductors in cable {CBL} IP-78. This underground cable runs from the IP3 CR {NA} panel FAR (Flight Panel) {PL} to the IP3 138 KV Control House (American Building) to the 345 KV South Ring Bus Control House offsite at the Buchanan Substation {FK}. Low insulation resistance readings were found between several conductors in this multi-conductor IP-78 cable. These conductors are associated with the direct trip circuitry which senses faults in the 345 KV system and provides protective action signals to the IP3 main generator {TB}. The most probable cause of the direct trip is low resistance readings between these two conductors allowing sufficient leakage current to activate the direct trip (TR1) relay {RLY}. This resulted in actuation of the main generator trip relays, 86P and 86BU, and an opening of the main generator output breakers {BRK} #1 and #3. An actual fault condition did not exist in the 345 KV transmission lines, but the low resistance in the direct trip circuitry caused a trip of the main generator in accordance with plant design. From the megger testing performed during troubleshooting of the direct trip circuitry, it appears that the conductor to conductor insulation {ISL} had degraded. Spare conductors were also tested within this same cable. Several of these were also found degraded. Two acceptable spare conductors were found with greater than 100 meg-ohm insulation resistance conductor to conductor. These conductors were substituted for the faulted conductors under a temporary modification. The trip circuits between Buchanan Substation and the IP3 main generator were subsequently satisfactorily tested for functionality.

## CAUSE OF EVENT

The direct cause of the RT was a main turbine trip with reactor power greater than the P-8 permissive set point due to a main generator trip as a result of a direct trip from the 345 KV Substation. This direct trip was most probably caused by degraded electrical cable insulation between several conductors in the direct trip circuitry in an underground cable between IP3 and the Buchanan 345 KV Substation. Subsequent to this RT, the AFW pumps automatically actuated due to a low-low S/G level signal as a result of S/G water level "shrink".



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## CORRECTIVE ACTIONS

The following are the corrective actions that have been or will be performed under the Authority's corrective action program to address the cause of this event:

- \* The faulted direct trip cable conductors were replaced with available spare conductors. The direct trip circuitry was satisfactorily tested for functionality.
- \* Inspection, testing, preventive maintenance and replacement of other cables routed between the IP3 Control Room and the Buchanan Substation are being evaluated as an extent of condition action. This includes an evaluation to determine if periodic testing of underground cables is warranted.

## ANALYSIS OF THE EVENT

This event is reportable under 10 CFR 50.73 (a) (2) (iv). The licensee shall report any event or condition that resulted in a manual or automatic actuation of any Engineered Safety Feature (ESF), including the Reactor Protection System (RPS).

This event meets the reporting criteria because an automatic RT occurred as a result of a main turbine trip above the P-8 set point satisfying the reactor protection system (RPS) logic for a reactor trip. Auxiliary feedwater automatically started due to low-low S/G level after the RT. In response to the event Licensing notified the NRC of an RPS/ESF actuation in accordance with 10 CFR 50.72 (b) (2) (ii), (ENS Log No. 37071).

A review of the past two years of Licensee Event Reports (LER) for events that involve RT caused by a Buchanan Substation related fault revealed no related events.

## SAFETY SIGNIFICANCE

This event had no effect on the health and safety of the public. There were no actual safety consequences for this event because the safety functions performed as designed when the RT occurred. The AFW (ESF) actuation was expected due to the S/G level "shrink" which can occur after an automatic RT from high power levels. The AFW system operated as designed. A loss of external electrical load/turbine trip is an analyzed event in Chapter 14 of the Final Safety Analysis Report (FSAR). Following the RT, the plant was maintained stable in the hot shutdown condition.

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This event was assessed for consideration as a safety system functional failure (SSFF). This event did not represent a SSFF because no safety system as per the requirements of 10 CFR 50.73 (a)(2)(v) failed to perform their safety function. The direct trip from the Buchanan Substation operated as designed in causing a main generator trip, which caused a main turbine trip and an automatic RT. AFW started as expected when the RT caused a "shrink" of S/G water level to the actuation setpoint.

There were no potential safety consequences of the event under the postulated design basis accident conditions. The plant protection systems are designed to fail into a safe state, as they did when the Buchanan Substation direct trip relay was actuated. The RT is a fail safe condition. The AFW system operated as designed for transients.